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8 bit Calculator ISA

ISA Specifications

- 4, 8-bit registers.
- All registers initially have value of 0.
- Load 4 bit immediate value into a register. Immediate is sign extended.
- Add/subtract two registers and store the result in a third register.
- Display a registers content to the console in integer, hexadecimal, and ASCII format.
- Compare two registers. If they are not equal, the next instruction is executed as normal. If they are equal, the instruction specifies to skip either 1 or 2 of the next instructions.

Implementation Details

Load Immediate

1	1	RD	RD	I_3	I_2	I_1	I_0

RD = $0bI_3I_3I_3I_3I_2I_1I_0$

Add

0	1	RD	RD	RS	RS	RT	RT

RD = RS + RT

Subtract

1	0	RD	RD	RS	RS	RT	RT

RD = RS-RT

Print

0	0	0	RT	RT	INT	HEX	ASCII

The last three bits are referred to as the formatting bits.
If INT = 1, RT's contents are printed to the console as an integer.
If HEX = 1, RT's contents are printed to the console in hexadecimal.
If ASCII = 1, RT's contents are printed to the console as an ASCII character.

NOTE: If more than one of the three formatting bits is set to 1, then all set options will be executed. i.e.: if INT = 0, HEX = 1, and ASCII = 1, then the value stored in RT will be printed out in hexadecimal and then immediately in ASCII.
At least one of the three formatting bits must be set in order for a value to be printed. One, two, or all three bits can be set if desired.
All prints are followed by a new line (return carriage).

Compare

0	0	1	S	RS	RS	RT	RT

- If RS != RT, then the next instruction gets executed normally.
- If RS = RT
  - 1 instruction is skipped if S = 0
  - 2 instructions are skipped if S = 1